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REFRIGERATION AND AIR CONDITIONING SYSTEM USING SENSOR

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Abstract-This paper presents the validation of a design model for vapour compression absorption refrigeration systems developed by Akintunde (2004a). The objective of this project was to substantiate and provide support for RAC Standard 1250/1251, 'Standard for Performance Rating of Walk-In Coolers and Heaters, air conditioning system.' In evaporator refrigerant liquid is converted to gas absorbing heat from the air in compartment and get cold water. Compressor is to circulate the refrigerant in the system under pressure this concentrates the heat it contains the low pressure gas change to high pressure. Air passing the condenser coil carries heat to receive the high pressure gas from compressor and convert the gas into liquid i.e. hot water. Expansion valve is removes the force from liquid to a vapour in the evaporator. An air conditioning system using for a dehumidifying cooling device has developed that comprising a heating source for producing hot water, a heat exchanger for transferring heat from the hot water to circulating water, a circulation pump for circulating the resulting hot water heated in the heat exchanger, a heating pipeline coupled to the circulation pump for conveying the hot water to a heat supply. A user heat exchanger connected to the heating pipeline for carrying hot water to the heat supply target area, a dehumidifying cooling device connected to a hot water pipe of users heat exchanger and installed in each household within the heat supply target area, the dehumidifying cooling device removing moisture from the air by using hot water supplied from the hot water pipe to deal with covert heat load and to lower the temperature of the dehumidified air via evaporation of water controlled in the air. All four things contain in our RAC system. In this project we can implements that measuring the coldness and hotness of water we can get specific temperature with the help of sensor. In this RAC system we give us hot water, cold water, hot air and cold air. These products combine with one so it is very effective.

Keywords- Validation, evaluation, COP, alternative, refrigerant, PIC16F877A, LM35 temp sensor, air conditioning system, micro c programming language, LCD display, relay.

I. INTRODUCTION

The desire of vapour compression system cycles, using R-12 and R-22 and other halocarbon compounds, had gone deep in the field of refrigeration and air-conditioning before the advent of ozone depletion.

Nowadays, Refrigeration and air conditioning systems are essential in parts of almost institution. Therefore, air conditioners and refrigerant are commonly found in various areas due to the natural demand for thermal comfort. RAC systems are classified into different types of various environmental applications. Among them, the most commonly used air conditioning units are split air conditioners. Split air conditioners are perfect for when on room requires cooling or heating for constant climate control. The reason why air is not more commonly used as a general-purpose refrigerant is because there is no change of phase, and is therefore too inefficient to be practical in most applications. Due to the low boiling point of its constituents, air is less often used as a refrigerant.

The process of succeeding and maintaining a temperature below that of the surroundings, the aim being to cool some product or space to the required temperature. One of the most important applications

of refrigeration has been the preservation of fresh food products by storing them at low temperatures. A refrigerant is a substance or mixture, usually a liquid, used in a heat pump and refrigeration cycle. In most cycles it undergoes level transitions from a liquid to a gas and back again. Many working fluids have been used for such purposes.

This paper defines an air conditioning system for indoor and outdoor using the control card for split type air conditioner based on a PIC16F877A microcontroller. If the refrigeration systems are redesigned based on thermodynamic properties of the working fluids. He further observed that if balanced points (as suggested by Stocker and Jones, 1982) between the refrigeration systems apparatuses (viz: compressor, condenser, evaporator and expander) are recognized and these components can work together at these balanced points then the performance will be enhanced.

In this paper, controller card based split air conditioning system is designed and constructed utilizing a PIC16F877A for all of heating and cooling processes and for home applications. The operation of this control card involves driving of various motor of the outdoor compressor, the refrigerative circulation, ventilation and wind direction adjustment, etc. The control card compiles with the legal and industry standards for the safety, reliability and performance.

II. DESIGN AND DRAWING

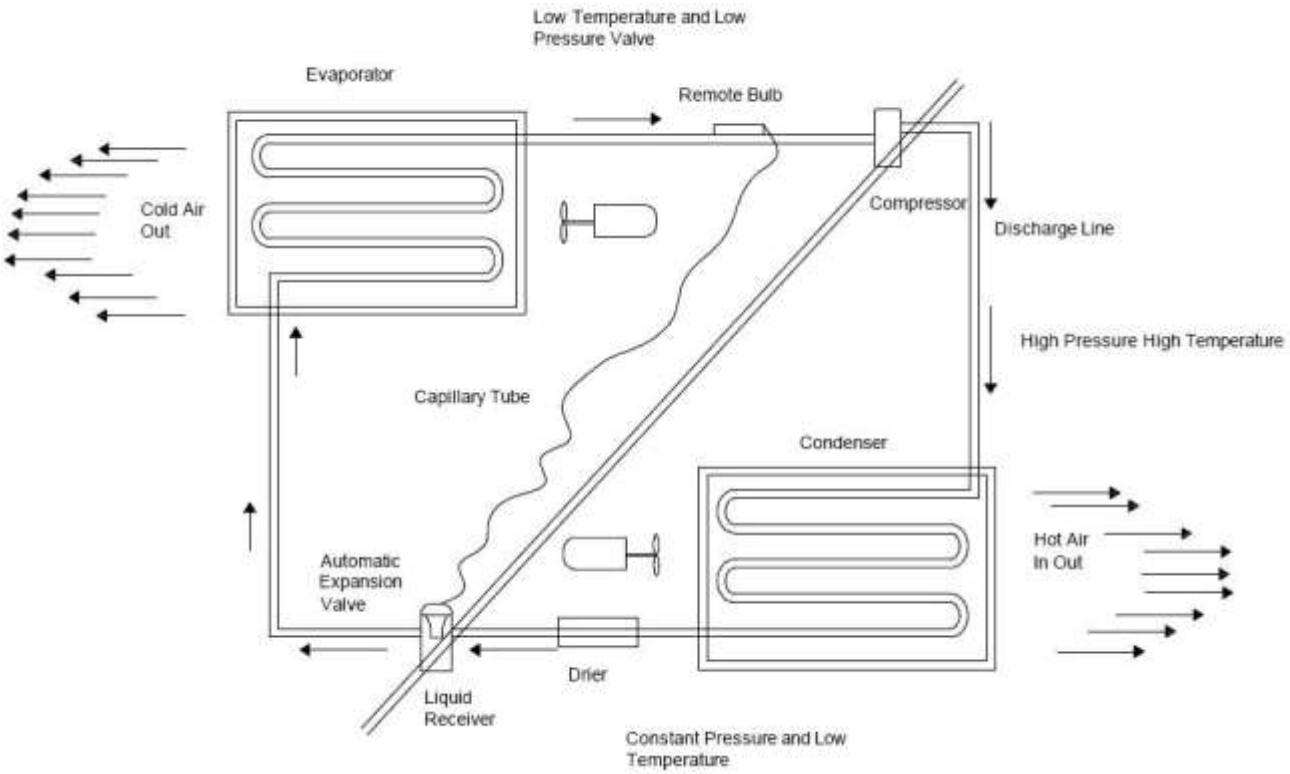

Fig.1 Refrigeration and Air conditioning System

WORKING PRINCIPLES OF REFIGERATION

1. As vapour refrigerant in the process of changed state to liquid, this is the phase where it absorbs or rejects large quantities of heat. The quantities of heat Immersed or rejected can be managed by controlling the pressure and temperature of the refrigerant.
2. The boiling point of closed-system liquid can be controlled by changing the vapour pressure.
3. Heat flows from a material at a higher temperature to a material at low temperature.

4. Heat energy is not created but converted and transferred.

WORKING PRINCIPLES OF AIR CONDITIONER

Ambient temperature affects directly working performance of persons. Hot or cold environment do certainly not sustain higher working efficiency and thermal comfort. The amount of cooling or heating indoor varies depending on outdoor and indoor temperatures. The cooling and heating can be achieved by an air conditioner. When the air conditioner is on, the compressor operates at a high speed in order to cool, or heat the room quickly. As the room temperature is equal to the reference temperature, the compressor slows down, maintaining a constant temperature and saving energy.

A. Working of Air Conditioner in Cooler Mode

The refrigerant is the NH3 liquid which flows through pipes to absorb the extra heat indoors. It then evaporates and is carried out through narrow copper tubes to the outdoor unit as a gas, where the heat is free into the air. Therefore, the gas becomes a liquid again and flows back to the door unit, where the air is ventilated to carry out the heat from the room. These processes are replaced up to the reference temperature is needed.

B. Working of Air Conditioner in Heater Mode

Heat pump air conditioning units additionally allow the circulation described above to be reversed. A heat pump extracts free heat from outdoor air and transfers the heat indoors. Thus, heat pump units eliminate the essential for heating system and allow the user to cool and heat with the same unit.

Electrical supply:

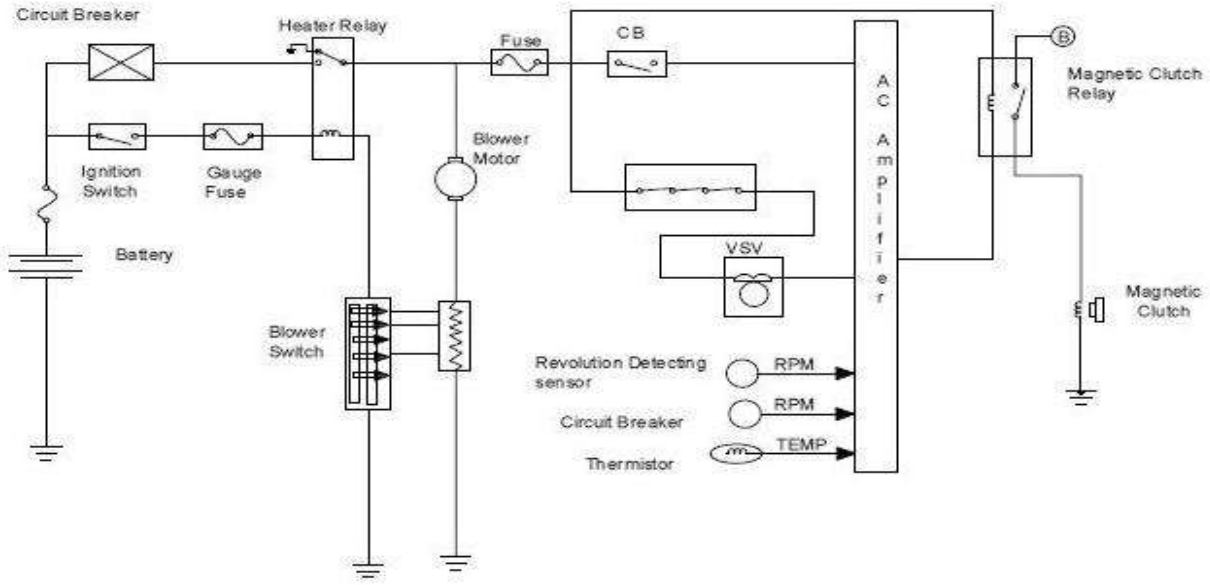

Fig.2. Electrical supply

III. HARDWARE DESIGN SCHEME

The whole system for hardware design block diagram. In this paper, the control card for RAC is constructed for hardware design based on PIC16F877A. The main proposed control card is fully controlled by the 8 bit microcontroller.

Hardware used: Compressor, Condenser, Evaporator, Expansion valve, PIC 16F877A microcontroller, LM35 temperature sensor, Liquid Crystal Display (LCD), Relay Driver Circuit (ULN 2003A), and related circuit components

1. COMPRESSOR

The function of compressor is no suck the vapour from evaporator and to compress it upto the condenser pressure. Unlike reciprocating compressors, centrifugal compressors are steady-flow devices hence they are subjected to less vibration and noise.

2. CONDENSER

Condensers and evaporators are essentially heat exchangers, surface area through which heat is transferred from vapours refrigerant to cooling medium. They have many things in common as far as the design of these components is concerned.

3. EVAPORATOR

Evaporator is to provide the required heat transfer surface area through which heat is observed by the vaporizing refrigerant from the cold chamber. Evaporation is an essential part of the water cycle.

4. EXPANSION DEVICE

The basic functions of an expansion device is reduce pressure from condenser pressure to evaporator pressure. Control the refrigerant flow from the high-pressure liquid line into the evaporator at a rate equal to the evaporation rate in the evaporator.

5. BLOWER:

This is the small blower that is fitted behind the evaporator or cooling coil inside the assembly of the window air conditioner system. The blower sucks the air from the room which first passes over the air filter and gets filtered. The air then passes over the cooling coil and gets chilled. This air is then delivered into the room from the supply air grid of the front panel.

6. CONDENSER FAN:

The condenser fan is the forced draft type of propeller fan that sucks the atmospheric air and blows it over the condenser. The hot refrigerant inside the condenser gives up the heat to the atmospheric air and its temperature reduces.

7. FAN MOTOR:

The motor inside the window air conditioner assembly is located between the condenser and the evaporator coil. It has double shaft on one side of which the blower is fitted and on the other side the condenser fan is fitted.

8. LM35 TEMPERATURE SENSOR

The LM35 series are accuracy integrated circuit temperature sensors. An output voltage proportional to the centigrade temperature can easily obtained using Linear Monolithic 35 which has a temperature range from -50(°C) to +155(°C) . Connection of LM35 temperature sensor is given in fig.

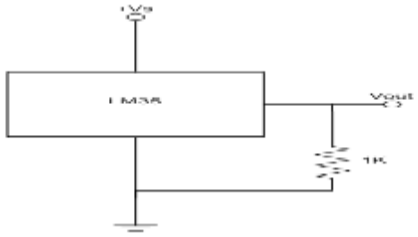

Fig.3. Connection of LM35 temperature sensor

9. LCD

Microcontroller controlled LCD are widely used in many application, having replaced most of their LEDs because of their low power consumption, low cost and flexible graphics display. This intelligent LCD module can show 160 different characters.

10. RELAY DRIVER

Relay is a high voltage and high current Darlington arrays IC. It contains seven open collector Darlington pairs with common emitters. Each channel rated at 500mA and can withstand peak currents of 600mA. Also relay operates particular time instant.

IV. FLOWCHART

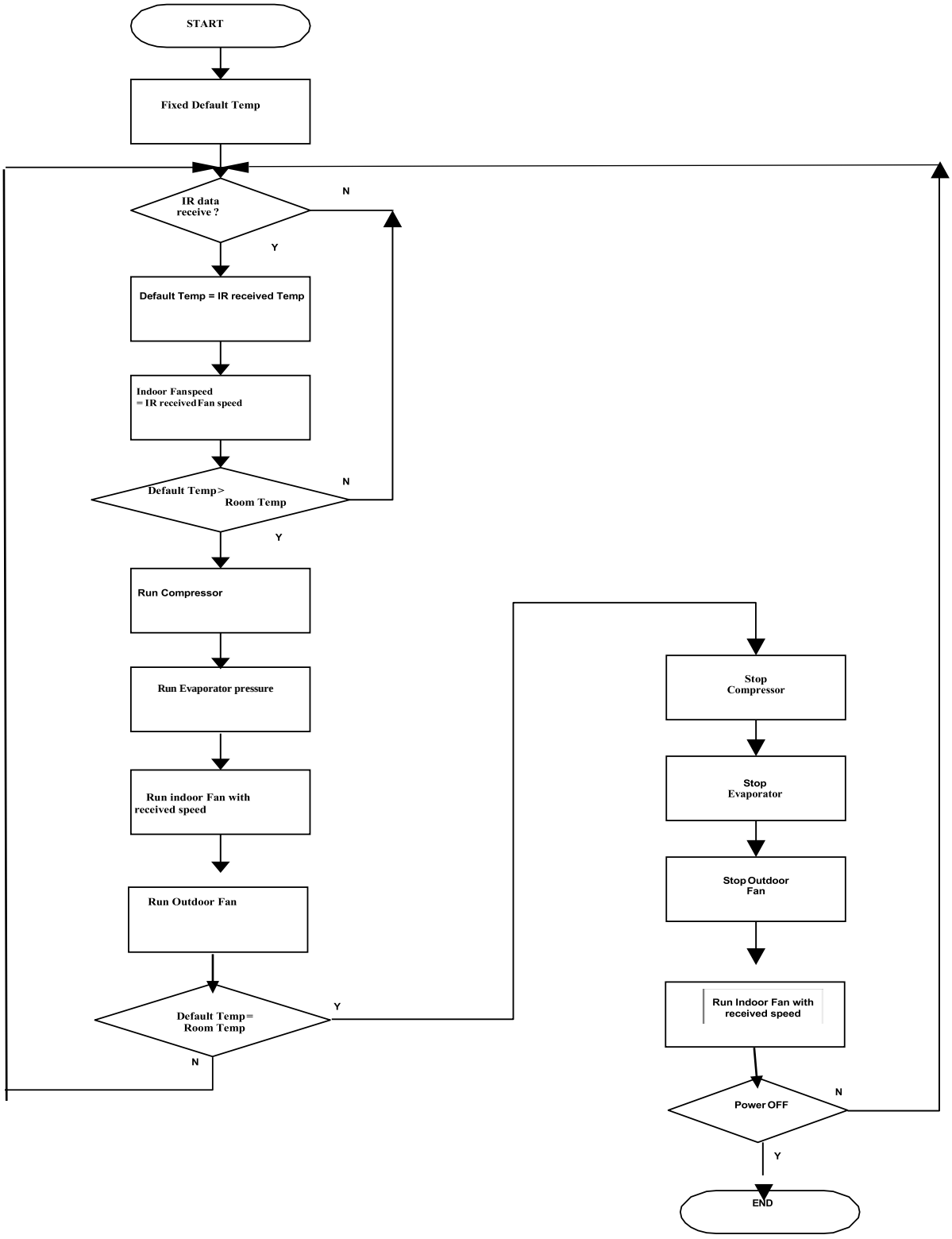

Fig.4.flowchart

V. RESULT

The results showed both refrigerants to have about the same heating (i.e. output) capacity, evaporating pressure and evaporating and condensing temperatures. Since the overall system performance is strongly inclined by operational parameters such as the evaporating and condensing temperatures, flow rates of refrigerant and the circulating water and ambient temperature, tests with the experimental rigout was planned in such a way as to allow for the evaluations of their effects on COP and various operational conditions. Evaporating temperature -5 degree C, condensing temperature 40 degree C, sub-cooled to 5 degree C and an average ambient temperature of 35 degree C.

VI. CONCLUSION

In this overall refrigeration and air conditioning system using temperature sensor we conclude that give us hot water, cold water, hot air and cold air. These products combine with one so it is very effective.

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